South Carolina Transportation Technology Transfer Service Summer 1999

T³S Quarterly

T³S Offers First "Hands–On" Motorgrader Training

By Frank Eskridge, P.E., T³S Workshop Coordinator

The Need

What's important to Local Government when it comes to budget preparation? This is the question Peter Zeck, Resource Conservation & Development (RC&D) Coordinator for the Edisto-Savannah Area, put before a recent meeting of County Administrators. Their response: The construction and maintenance of Rural Roads. This issue stands out as the strongest budget item, by far. How do we manage this part of our spending more wisely and effectively?

One part of the solution is to carefully analyze the scope and difficulty of the problem and then to develop a plan of attack, based on priorities and goals, that allocates proper resources needed to execute this plan. The term "proper resources" includes well–maintained equipment and highly–motivated, well–trained personnel who understand the importance of what they do.

The county administrators' concern over the Rural Roads issue led to a request for Motorgrader Operator training. Searching for a source of possible assistance, Zeck called on Clemson's Transportation Technology Transfer Service (T³S). A "Maintenance of Unpaved Roads" training course previously delivered by T³S turned out to be a good starting point. A call to John Hopkins, then at the Idaho T² Center, who presents this training and has an extensive research and experience background in this topic, provided assurance that the Unpaved Roads course could be modified to make a reasonably strong program to meet this need. John's suggestions for including a "hands–on" session for half of the one–day event, along with a few presentation modifications, turned this into an excellent program.

The Host

With programming input and logistical assistance from Aiken County Administrator, William Shepherd, and Public Works Director, Alvin Bryant, the agenda was finalized to include a half–day in the classroom and a half–day in field demonstrations. Two all–day sessions were scheduled and presented on April 21, 22, with over 50 operators from Aiken, Orangeburg, Bamberg, Beaufort, and Barnwell Counties participating. The classroom session included review of roadway and drainage design, and bank stabilization, as well as discussion of

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In This Issue…

Morning "in–class" instruction.

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operation and maintenance of a motorgrader. The field demonstration segment allowed opportunity for all participants to actually operate a motorgrader. The weather cooperated and the outdoor portions of the programs went off without a hitch.

In the Classroom

The classroom session included roadway design topics on surface profile and drainage characteristics, drainage discharge onto private property, effects of heavy vehicles and high traffic counts, distress conditions, and maintenance operations. The drainage design segment reviewed ditch location and construction, ditch maintenance, and runoff velocity controls. Vegetation and structures used for slope stabilization purposes were also presented. Fundamental elements of a motorgrader and how they function were discussed. And a number of pointers were given on how to optimize the safe use of the motorgrader in roadway building and maintenance situations.

A plan was presented for the exercise that would be repeated by each operator in the afternoon session, and the points on which they would be evaluated were reviewed.

In the Field

For operator evaluation each operator was asked to make six passes with the grader to establish a side-ditch profile on each roadside while pulling a proper crown at the road centerline. Several additional passes would then set the grade back to its original level allowing the next operator to start from a similar starting point. With the rest of the class standing by to encourage and criticize there was plenty of good–natured advice and counsel as the participants took their turns.

Aiken County Public Works provided a closed segment of a typical unpaved roadway as well as the motorgrader used in this program. Their logistical support in safety–taping the work zone and standing by with the equipment and materials needed for this program allowed it to be a safe and enjoyable experience for all who participated.

A Success!

From the responses volunteered in the participant evaluations of this program the event has been deemed a successful learning experience that will hopefully provide bottom–line impact for the counties who participated.

T^3S greatly appreciates the participation and assistance of John Hopkins in offering the first "hands–on" operator training that we have sponsored. The success of this first program has evidently "gotten out" as we have already been approached by another county that wishes to host a similar program.

Workshop instructor, John Hopkins, gives instructions during the afternoon "hands-on" field portion of the workshop.

The Season for Wildflowers

Roadside wildflower plantings have been touted for their beauty and even for the beneficial effect that they have in reducing "highway hypnosis" in drivers. But, did you know that they have much more to offer than that? Wildflower plantings along roadways also can provide significant ecological and economic benefits. Roadside wildflower plantings require less time and money, and fewer resources than required for the traditional mowed turfgrass areas. If the highway is planted with native vegetation, it can provide food and habitat for wildlife. Once the wildflowers become well established, they are less susceptible to weed invasions, and they require less maintenance.

Ecological Benefits

The plant community is significantly more diverse when highway rights–of–way are managed as meadows rather than turfgrass landscapes. And it has long been recognized that diversity of habitat is important to environmental health and quality. Highway meadows can provide a suitable habitat for wildlife and insects. If they were implemented on a large scale, highway meadows could provide a network of linked corridors that would support a diversity of plant and animal life.

Another benefit is the reduction in the negative environmental effects that result from maintaining highway rights–of–way as turfgrass landscapes. Managing highway rights–of–way as turfgrass landscape will lead to pesticides, oil, gas, lead, and sediment being added to the runoff. On the other hand, the maintenance of wildflower plantings along the right–of–way does not require the use of pesticides, so this form of pollution can be reduced or eliminated. Other pollutants can be reduced by wildflowers themselves, because wildflowers trap and filter airborne pollutants on their leaves and stems. The efficiency of this mechanism increases proportionately to a plant's total surface area. So, for example, a growth of wildflowers 2 to 3 feet high will be more efficient at trapping pollutants than a growth of turfgrasses that are only 6 inches high. Furthermore, once these pollutants are trapped by the vegetation, they are more likely to leach into the soil rather than run off into the surface waters.

Economic Benefits

Plantings of wildflowers require much less mowing than do plantings of turfgrass. For example, turfgrasses must be mowed 6 to 20 times per year (depending on the weather and the desired appearance), while it is only necessary to mow wildflower plantings once a year. This will obviously lead to very substantial savings in maintenance costs.

Going Native

Most right–of–way areas require vegetation that can quickly form a dense vegetation cover or — in the case of trees, shrubs, ground covers, and flowers — is very hardy, fairly easy to maintain, and, of course, pleasing to the eye. Much of the vegetation planted along highways was selected because it met one or more of the above criteria. More and more, another criterion is being used: whenever possible native species should be used. Plants that are native to an area have a proven track record of survivability. They are naturally hardy and tolerant of the local climate. They are also attractive, and their use is consistent with sound conservation practices. Another reason for the increasing use of native plants is that non–native species can be invasive. Think, for example, of the problems caused by the importation of kudzu. However, it is generally acceptable to include non–native species in plantings when the species are known not to be aggressive or invasive.

Editor's Note: This article was adapted, with permission, from *The Road Ahead,* June 1999.

Electrical Safety

by Stephanie R. Fishman

Work around electrical power is one of the greatest dangers facing highway crews. For their safety, they must know about electricity and how to work around it. This article describes the effects of electrical shock, the electrical power system, safety around electrical distribution lines, and preventive measures.

Effects of Electrical Shock

Current is the killing factor in electrical shock. Voltage is important only in that it determines how much current will flow through the body's resistance. Current is measured in amperes or milliamperes (1/1000th of an ampere). Electric utilities classify effects of current if it breaks through the skin, since that risk can occur in emergencies. Table 1 summarizes effects of 60-hertz current on an average human body for that situation.

To put these values in perspective, the current necessary to operate a 120-watt light bulb is 8 to 10 times more current than would kill a person. A 12-watt bulb carries 90 milliamperes (ma), which can be fatal if it breaks through skin and the body's resistance. The current in other everyday objects such as Christmas tree lights (60 to 90ma), electric razors (100ma), and hair dryers (8000ma) could also be fatal. These common objects are fatal if the current actually breaks through the skin and body resistance.

Above–ground wires, however, carry enough force to break through the body's resistance immediately upon contact. The force in these wires can be up to 35,000 volts. The current flow at the body's resistance level and 120 volts is 240ma, over twice that which causes death. Thus, any contact with down lines means death instantaneously.

Electric Power Systems

As shown in Figure 1, a typical above ground electrical system includes generating stations, step-substations, transmission lines, step-down substations, distribution lines, and residential, commercial and industrial customer service installations.

The distribution lines along highways are 2,400 volts and higher, and very dangerous.

Public Works on the Scene

In emergencies, public works personnel might encounter fallen wires and cables. In such situations, workers can be more concerned about correcting the public works emergency than their own safety. *The workers' safety should always be put first, especially around down wires.* In all instances of down lines, workers should call the electric utility.

In routine, that is, non-emergency operations, each crewmember should be fully aware of the hazards of operating equipment near power lines. They should know the proper safety practices to follow.

Before beginning operations in non-emergency situations always notify P.U.P.S (Palmetto Utility Protection Service, Inc. 1-888-721-7877, Web Site: www.sc1pups.org) so that underground utilities can be marked.

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Table 1. Effects of 60-hertz current.

Current Values through Body Trunk in Milliamperes	Effect on Average Human Body
1 or less	No sensation
1-8	Sensation of shock. Person can let go.
8-15	Painful shock. Person can let go at will, if muscle control not lost
15-20	Painful shock.. Muscle control to adjacent muscles lost.
20-50	Painful. Severe muscular contraction. Breathing is difficult.
50-100	Probable death.
Greater than 100	Death

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Request the cooperation of the line owner to de-energize and ground the lines or to help provide insulated barriers.

The National Institute for Occupational Safety and Health (NIOSH) encourages employers to consider de-energization as the primary mean of preventing injury from contact between equipment and power lines.

The first step when starting an emergency or non–emergency project near power lines is to determine the best placement for machinery during operations and the size and type of machinery to be used. Find the locations and voltage of all overhead power lines at the job site.

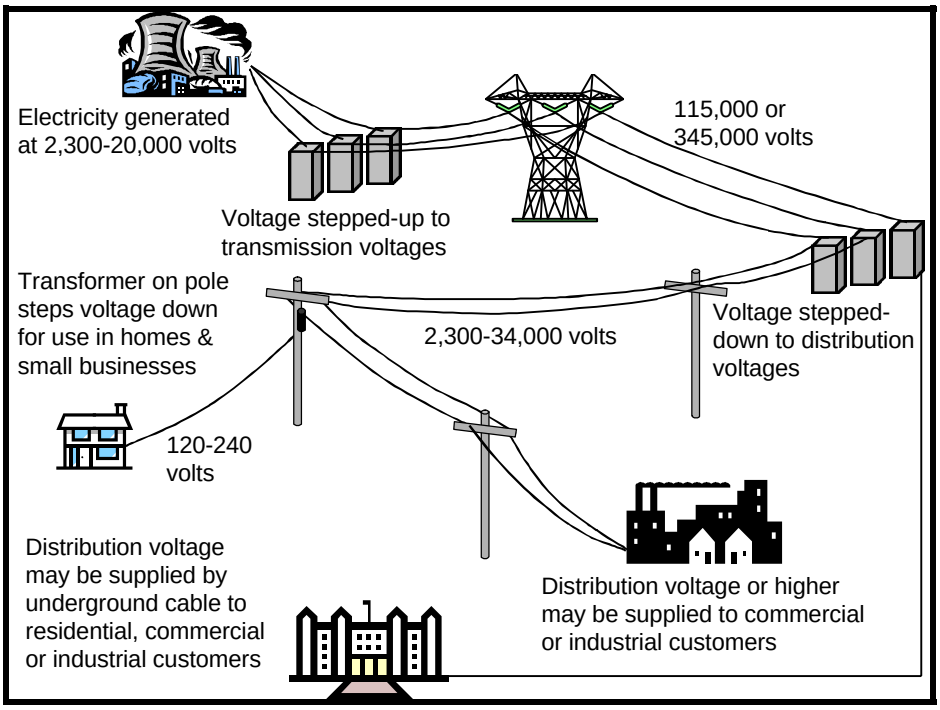
Everyone around the site should be alert. Don't let the quiet, "harmless appearance lull you into a false sense of security." Although many overhead wires are covered, the covering is often designed to protect the wire from the weather or tree contact, not to protect you from the wire. Never consider a covered wire any safer than a bare wire.

Stay away from hanging or downed power lines and anything they are touching, including puddles of water, fences, trees, or people. Be aware that lightning or fallen wires could electrify wire or metal structures. Also remember that where there is one broken wire, there could be others.

Thus, in putting safety first one should remember:

- Don't expose personnel to unnecessary potential risks.
- Always treat conductors as energized.
- Stay at least 10 feet away from down wires. Workers should place barriers to keep others away.

Figure 1. Typical Electrical System.



Preventive Measures

Several preventive maintenance actions can decrease workers' chances of having to deal with down lines on a site.

When trees or limbs fall, they often fell electrical lines as well. Supervisors and workers should be on the look out for trees growing close to wires. When tree branches are close to wires, they should notify the local power company to trim the tree limbs. Municipal crews should never work on trees that are touching power lines.

Workers can prevent accidents by watching out for power lines around machinery, such as dump bodies, backhoes, and crane booms.

Special thanks to:

Ernest A. Guimond, Safety & Health Administrator, Public Service of New Hampshire (603) 634-2621

Sources:

Coming to Terms with Power Outages, Training Manual, Northeast Utilities
Preventing Electrocutions of Crane Operators and Crew Members Working Near Overhead Power Lines, National Institute for Occupational Safety and Health

Editor's Note: This article was adapted, with permission, from *Road Business,* Spring 1999.

SCDOT UPDATE

Lab Manual Nearing Completion

The South Carolina DOT Research and Materials Laboratory is proceeding on a fast–track schedule to complete and publish this summer at least part of its proposed four–volume materials manual.

Volume I of the *Materials Manual*, which describes the laboratory procedures used in testing highway construction materials, will be completed this summer. This volume represents the first phase of the lab's ultimate goal of producing a multi-volume manual on all the procedures and requirements of the Research and Materials Laboratory.

The manual is being developed and assembled primarily for the guidance of engineers, managers and technicians in SCDOT laboratories who are engaged in, and responsible for, field sampling, inspection, and testing of construction materials. The manual will also help ensure that an effective system is operational for the control of materials proposed for use in highway projects.

Special emphasis has been placed on producing a comprehensive document that will adequately and clearly identify each procedure the lab employs. A primary purpose of the manual is to ensure that appropriate SCDOT personnel and its contractors have a uniform system to implement the required processes in a professional manner.

Subsequent volumes will address Independent/Quality Assurance, Field Procedures and Approval Sheets.

New Research Projects

Review of Class E Concrete Mix Used in Bridge Decks in SC

Causal Factors and Possible Solutions to Reduce Highway Accidents Caused by White-Tailed Deer in SC

Evaluation of Retroreflectivity of Interstate Markings

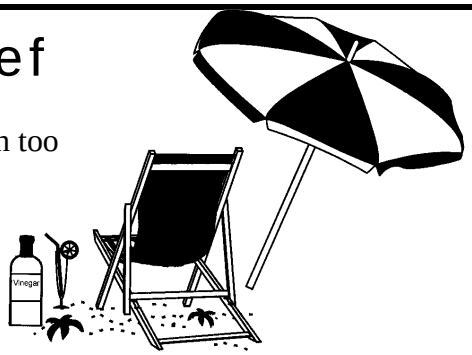
Development of a Process to Forecast Construction Staffing Levels

BRIDGE TO THE FUTURE: State-of-the-Art Pedestrian Bridge and Gateway to Columbia

Editor's Note: This article was submitted by Karen Nicholson of the SCDOT.

Sunburn Relief

Been out in the sun too long? Rub full-strength vinegar (white or cider) on your skin, and you'll feel immediate relief from sunburn pain.



He who asks a question is a fool for five minutes; he who does not ask a question remains a fool forever.

—Chinese Proverb

13

The Year's Unluckiest Day

August 13 is the only time in 1999 that Friday occurs on the 13th. The day's superstitious reputation stems from the Last Supper, when Christ ate with his 12 disciples. Judas, the thirteenth guest at the dinner, betrayed him to the Romans. The next day, believed to be a Friday the 13th, Christ was crucified. This led to the belief that it was unlucky to have 13 people at a meal, and that one of them would die within the year.

Friday the 13th usually occurs twice in a year, but in some years three times.

WE NEED YOUR HELP!!!!

We will soon begin to plan our workshop program for next year. We need your help in identifying the workshops that will provide the most benefit to the greatest number of our customers. Please take a few minutes to place X's by the topics below that are of most interest to you and your organization, and then mail or fax a copy of this page to **Sandi Priddy** at the address or phone number shown on page 8 of this newsletter. Thanks for your assistance.

__ Asphalt pvmt. constr. & inspection	__ Pavement management systems	__ Highway safety
__ Asphalt pavement recycling	__ Vegetation management	__ Public transit operations
__ Superpave mix design	__ Basic stormwater drainage concepts	__ Highway accident reconstruction
__ Asphalt pavement rehabilitation	__ Stormwater drainage design	__ Intelligent transportation systems
__ Utility cuts & repairs	__ Highway subgrade preparation	__ Minimizing tort liability
__ Fundamentals of quality concrete	__ Workzone traffic control	__ Basic math skills
__ Concrete finishing	__ The road to better traffic control	__ Adopting the metric system
__ Soils fundamentals	__ GIS for transportation systems	__ Effective technical writing
__ Excavation safety	__ Highway access management	__ The technical person as manager
__ Maintenance of unpaved roads	__ Use of waste products in transp	__ Leadership skills for supervisors
__ Geotextiles in soils & pavements	__ Setting safe speed limits	__ Building effective teams
__ Erosion control	__ Uniform traffic control devices	__ Stress management

Other Possible Topics

Name: _____

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Phone _____ Fax _____

- ❑ ***This is a new address***
- ❑ ***Please add my name to your mailing list***

News Flash:
T^{3}S Gets New Phone Number!

Effective July 1, 1999 the Transportation Technology Transfer Service now has its own phone number: **864-656-1456**. The new number rings directly to T^{3}S rather than to the Civil Engineering Department as in the past.

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